ACTA ODONTOLOGICA SCANDINAVICA, 2016
VOL. 74, NO. 3, 236–240
http://dx.doi.org/10.3109/00016357.2015.1103898

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ORIGINAL ARTICLE

Dental treatment injuries in the Finnish Patient Insurance Centre in 2000–2011

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ABSTRACT

Objective The Patient Insurance Centre in Finland reimburses patients who sustained injuries associated with medical and dental care without having to demonstrate malpractice. The aim was to analyse all dental injuries claimed through the Patient Insurance Centre over a 12-year period in order to identify factors affecting reimbursement of claims. **Methods** This study investigated all dental patient insurance claims in Finland during 2000–2011. The injury cases were grouped as (K00–K08) according to the International Classification of Diseases (ICD-10). Calendar year, claimant's age and gender, dental disease group and health service sector were the explanatory factors and the outcome was the decision of a claim. Multiple logistic regression modelling was used in the statistical analyses. **Results** The total number of decisions related to dental claims at the PIC in 2000–2011 was 7662, of which women claimed a clear majority (72%). Diseases of the pulp and periapical tissues (K04) and dental caries (K02) were the major disease groups (both 29%). Of the claims 40% were eligible for reimbursement, 27% were classified as insignificant or unavoidable injuries and 32% were rejected for other reasons. The proportion of reimbursed claims declined during the period. Patients from the private sector were more likely to be eligible for compensation than were those from the public sector (OR = 1.89, 95% CI = 1.71–2.10). **Conclusions** The number of dental patient insurance claims in Finland clearly rose, while the proportion of reimbursed claims declined. More claims received compensation in the private sector than in the public sector.

ARTICLE HISTORY
Received 26 June 2015
Revised 31 August 2015
Accepted 28 September 2015
Published online 29 October 2015

KEYWORDS
Dental claims; injury; insurance; patients; treatment

Introduction

With the exception of some countries, liability for injury compensation is usually based on intentional fault or negligence. In the Nordic countries and in New Zealand, for instance, an injured patient does not sue, but instead submits an insurance claim to the national Patient Insurance Association of the country. Patients must meet certain conditions before receiving compensation for the injury and these qualifying conditions differ slightly from country to country.

Few international studies have examined patient injuries in the Nordic countries. Patient safety studies show that injuries (adverse events) are common in hospital care: 4–16% of hospitalized patients in developed countries suffer from adverse events.[1] Currently we don't know much about the rate of patient injuries in dental care. One Swedish study explored gender and age differences in the patient injuries.[2] Other studies in Finland have investigated financial compensation for radiotherapy-related adverse events [3] and treatment injuries in reimbursement claims for femoral fractures in children.[4] In Denmark, researchers have studied deaths among children during 1996–2008 from closed claims registered with the Danish Patient Insurance Association,[5] as well as endodontic malpractice claims during 1995–2004.[6]

The Finnish Patient Insurance Centre (PIC) handles compensation procedures for patient injuries that occur in Finland as provided in the Patient Injuries Act. All health and medical care providers must be covered by insurance against liability arising as provided in the Act passed in 1987.[7] The PIC in Finland reimburses patients who have sustained injuries associated with medical care without having to demonstrate the treatment to be faulty. In the Nordic systems, the PIC uses an avoidability standard, defined as an injury that would not have occurred in the hands of an experienced practitioner. According to the Finnish Patient Injuries Act, a patient is eligible to receive reimbursement if the injury matches one of the following seven criteria: treatment injury, infection injury, accidental injury, injury from a deficient device, injury from damage to premises or equipment, injury from improper delivery of pharmaceuticals and unreasonable injury. Treatment injury refers to an injury resulting from examination, treatment or other similar action taken or neglected with respect to a patient, provided that an experienced healthcare professional would have examined, treated or taken other similar action with respect to the patient in another manner and would, therefore, have probably avoided the injury.

The majority of all eligible injuries are treatment injuries. In 2011, for instance, ~90% of all eligible injuries were treatment

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injuries.[8] Dental diseases are among the largest disease groups: dental diseases (K00–K08) constituted the third largest disease group in the Patient Insurance Centre in 2000–2008.[9] Since the Finnish Patient Injury Act went into effect in 1987, the database at the PIC has served as a valuable source of information for research purposes, although only recently have researchers begun to use this information to its full potential. Overall, studies of dental patient injuries in Finland and in the Nordic countries are few. The Finnish PIC has presented research on odontogenic infections requiring hospital care in 2000–2003 [10] and adjudicated dental injuries in 2000–2008.[9]

Our aim was to analyse all dental injuries in 2000–2011 handled through the Finnish PIC in order to obtain information about factors affecting reimbursement for claims. The aim was also to study claims and decisions from both the public and private sectors as well as those related to specific disease groups and injuries.

Materials and methods

We investigated all dental patient insurance claims in Finland over a 12-year period (2000–2011). The Ministry of Social Affairs and Health granted permission for the study and the Finnish Patient Insurance Centre approved it.

The Finnish PIC handles all compensation procedures for patient injuries that occur in Finland. When the centre received a claim, expert physicians and dentists diagnose the injury and handle the claim based on all patient documents, radiographs, etc., including decisions of possible compensation. These experts use the following three categories for their decisions: (1) injuries eligible for reimbursement, (2) insignificant or unavoidable injuries and (3) injuries rejected for other reasons. An injury is considered to be insignificant if it causes the patient only slight pain and suffering, no permanent functional disability, no aesthetic injury or the costs incurred are minor. Information on these cases is transferred to the Centre's electronic register/compensation system. Resolved patient injury cases are grouped according to the International Classification of Disease (ICD-10). All events are registered in a national PIC database.[9]

We analysed the data of all claims and decisions concerning dental injuries handled between 2000–2011 by the Finnish PIC, including all the cases ($n = 7662$) classified as K00–K08 according to the ICD-10. The outcome variable was the decision on a claim. Claimant's age and gender, health service sector (public or private), dental disease group and calendar year of the claim decision were the explanatory factors.

We separately analysed compensated and uncompensated dental injury claims from the public and private sectors by dental disease. The analysis included the three largest groups of dental diseases: dental caries (K02), diseases of the pulp and periapical tissues (K04) and other disorders of the teeth and supporting structures (K08). We combined all remaining dental disease groups under 'other'. We then divided the age variable into five categories: 0–19, 20–39, 40–59, 60–79 and 80–98 years. The insurance sector had four categories: public sector, private sector, no insurance needed and sector unknown. The analysis included both the public and private sectors and the multiple analyses categorized the time of claim into three periods: 2000–2003, 2004–2007 and 2008–2011.

Statistical analyses

We used multiple logistic regression modelling to estimate odd ratios (OR) and their 95% confidence intervals (CI) using a regular binary model for compensated claims vs uncompensated claims as the outcome variable and a cumulative model with three outcome categories: (1) injuries eligible for reimbursement, (2) insignificant or unavoidable injuries and (3) injuries rejected for other reasons. Chi-square test was used to analyse differences between study groups. The explanatory variables for both models were age, gender, insurance sector, calendar period and dental disease. We used the statistical package R environment version 3.0.2 for all statistical analyses.

Results

From 2000–2011, the total number of decisions related to claims was 7662. Of these, women made a clear majority (72%). A clear majority of the claimants were 20–59 years old (75.4%). One-fifth (18.8%) of claimants were 60 years or older and 5.8% younger than 20 years. Of all claims, 40.4% received compensation, 27.4% were classified as insignificant or unavoidable injuries and 32.2% were rejected for other reasons.

Table 1 shows the numbers of various dental diseases according to the ICD-10 groups. The largest dental disease groups were diseases of the pulp and periapical tissues (K04) (28.8%), dental caries (K02) (28.8%) and other disorders of the teeth and supporting structures (K08) (23.1%). Of all cases related to K02, a majority of the claims ($n = 1394$) were classified as caries of dentine (K021). Of the cases related to K08, most ($n = 1140$) were classified as loss of teeth due to accident, extraction or local periodontal disease (K081).

The percentages of compensation decisions of the claims appear in Table 2. We found no general gender differences in reimbursed or rejected claims. The mean age of the claimants was 44.6 years (SD = ±16.1). About 40% of the claims for 20–59 years old received compensation. The percentage of eligible claims was 30.8% for the youngest claimants (< 20 years) and 27.4% for the oldest (≥ 60 years) claimants. This group also had the highest number of claims classified as rejected for other reasons. Patients from the private sector were more likely to be

Table 1. The number and percentage (%) of dental diseases (K00–K08) of all the claims in the Patient Insurance Centre during 2000–2011.

Dental diseases ICD-10 groups		
Dental disease	*n*	%
Diseases of pulp and periapical tissues (K04)	2210	28.8
Dental caries (K02)	2205	28.8
Other disorders of teeth and supporting structures (K08)	1770	23.1
Gingivitis and periodontal diseases (K05)	531	6.9
Dentofacial anomalies (including malocclusion) (K07)	421	5.5
Embedded and impacted teeth (K01)	290	3.8
Other diseases of hard tissues of teeth (K03)	125	1.6
Disorders of tooth development and eruption (K00)	82	1.1
Other disorders of gingiva and edentulous alveolar ridge (K06)	27	0.4
Total	7661	100

Table 2. The number and percentage (%) of PIC decisions on claims by gender, age, sector and dental disease.

	Decision group							
	Compensated injury		Insignificant injury, not avoidable		Other reason for rejection		Total	
	n	(%)	*n*	(%)	*n*	(%)	*n*	(%)
Gender								
male	884	(41.2)	602	(28.0)	661	(30.8)	2147	(100)
female	2207	(40.0)	1497	(27.2)	1805	(32.8)	5509	(100)
Age								
0–19	137	(30.8)	96	(21.6)	212	(47.6)	445	(100)
20–39	1039	(42.9)	677	(28.0)	706	(29.1)	2422	(100)
40–59	1410	(42.0)	948	(28.3)	996	(29.7)	3354	(100)
60–79	491	(35.7)	363	(26.4)	521	(37.9)	1375	(100)
80–98	17	(27.4)	15	(24.2)	30	(48.4)	62	(100)
Sector								
private	2130	(46.9)	1124	(24.8)	1284	(28.3)	4538	(100)
public	964	(31.3)	971	(31.6)	1143	(37.1)	3078	(100)
ICD-10								
K02	812	(36.8)	581	(26.4)	812	(36.8)	2205	(100)
K04	871	(39.4)	725	(32.8)	614	(27.8)	2210	(100)
K08	835	(47.2)	360	(20.3)	575	(32.5)	1770	(100)
other	575	(39.0)	434	(29.4)	467	(31.6)	1476	(100)
Total	3094	(40.4)	2100	(27.4)	2468	(32.2)	7662	(100)

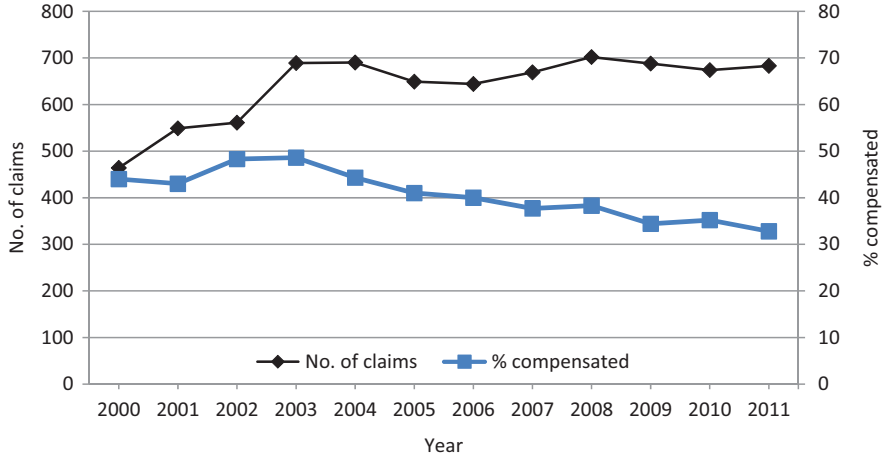

Figure 1. The number of dentistry-related claims and the percentage (%) of compensated claims in the Patient Insurance Centre from 2000–2011.

eligible for reimbursement (46.9%) than were those from the public sector (31.3%). The highest proportion of eligible claims by disease group was for other disorders of the teeth and supporting structures (47.2%).

The number of dental claims in Finland increased from 2000–2003, but then levelled off at about 700 claims per year (Figure 1). Figure 1 shows the time trend in the percentage of eligible claims from 2000–2011 in the PIC: the percentage of compensated patient injury cases was highest in 2003 (48.3%) and decreased thereafter so that about one-third of the cases (32.8%) received compensation in 2011.

The multiple logistic regression model for the binary outcome showed that patients from the private sector were more likely to receive compensation than were those from the public sector (OR = 1.89, 95% CI = 1.71–2.10) (Table 3) and older patients (20–39 years) were more liable to receive compensation than were younger patients (< 20 years) (OR = 1.34, 95% CI = 1.07–1.68). The cumulative logistic regression analyses showed similar results, highlighting the working-aged more and revealing that women received less compensation than men did (OR = 0.89, 95% CI = 0.81–0.98) (not shown in the figures). Diseases of the pulp and periapical tissues (K04) and other disorders of the teeth and supporting structures (K08) were more likely to receive compensation than were dental caries (K02) (OR = 1.19, 95% CI = 1.05–1.35) and (OR = 1.54, 95% CI = 1.34–1.76) (Table 3).

Discussion

This comprehensive study sheds light on dental patient injuries and factors affecting the compensation of injury claims in the Finnish patient insurance system without liability consideration. The number of claims at the national Patient Insurance Centre increased clearly during the 12-year period. A clear majority of the claims were by women and from the private sector.

Although research on dental patient injuries is scarce; some studies have examined endodontic insurance claims, which are one of the most frequent types of dental claims.[6,11–14] In our study, the largest dental disease group was diseases of the pulp and periapical tissues (K04), which includes all

Table 3. Binary logistic regression model for eligible claims vs ineligible claims.

Variable	B	SE	OR	95% CI	*p* value
Gender (male)	reference				
female	−0.10	0.05	0.91	(0.82, 1.01)	0.07
Age (0–19)	reference				
20–39	0.29	0.11	1.34	(1.07, 1.68)	<0.001
40–59	0.10	0.12	1.10	(0.88, 1.39)	
60–79	−0.19	0.13	0.82	(0.64, 1.05)	
80–98	−0.55	0.31	0.58	(0.31, 1.06)	
Sector (public)	reference				
private	0.64	0.05	1.89	(1.71, 2.10)	<0.001
ICD-10 (K02)	reference				
K04	0.17	0.06	1.19	(1.05, 1.35)	<0.001
K08	0.43	0.07	1.54	(1.34, 1.76)	
other	0.15	0.07	1.16	(1.01, 1.34)	
Year (2000–2003)	reference				
2004–2007	−0.21	0.06	0.81	(0.72, 0.91)	<0.001
2008–2011	−0.41	0.06	0.67	(0.60, 0.75)	

Chi-square test was used.

endodontic diseases. Endodontic claims are often related to and classified as technical errors or incorrect treatment, in which case the most frequent cause is linked to the quality of root fillings.[6,11] Study of the medico-legality of vertical root fractures revealed that poor-quality root fillings were associated with an extended delay of diagnosis.[15] In Denmark, 12.8% of dental claims in 2000–2004 were classified as cariology claims,[6] whereas almost one-third (28.8%) of the claims in our study fell into the dental caries category (K02). The reason for the large difference might stem from our use of the ICD-10 classification, which is based on disease diagnosis rather than treatment. Dental malpractice claims have also often been associated with prosthetic crown and bridge treatments and dental surgery, but the rates vary across countries.[6,16]

The Danish Dental Complaints board reported an increase in the number of malpractice claims from the late 1990s to the early 2000s,[6] a finding which is in line with our study. In Italy, the number of litigation cases involving dental professionals also rose between 2001 and 2011.[11] The Nordic countries and their healthcare systems are nearly identical, unlike those in other European nations. Unfortunately, variance in handling procedures and insurance systems, for example, make direct comparisons between countries in these matters challenging.[17]

The Finnish Patient Insurance Centre collects all information relating to all patient injury claims. Since 1987, the PIC has assembled lots of patient insurance information and, according to the aims of the PIC, uses it to research and promote injury prevention in future. Unfortunately, little of the information has served research purposes, although some studies have begun to reverse this trend in recent years. For example, researchers have reported on fatal surgical or other procedure-related errors, otorhinolaryngological patient injuries and urological complications related to inguinal hernia surgery.[18–21] In addition, other studies have examined claims and compensation at the PIC for common surgical procedures and dental injuries.[9,16,22,23]

As in all Nordic countries, the public sector in Finland is comprehensive and widely used. For example, about half of all dentists work in the public sector. The percentage of eligible patient injuries from the private sector is reportedly less than 20% in all disease groups: the only exception is dental diseases, ~70% of which received compensation.[9] In our study, almost half (46.9%) of all dental patient injury claims from the private sector and about one-third (31.3%) from the public sector received compensation. Several factors may explain for this difference: patient profiles in the different health sectors and, therefore, treatment procedures are somewhat different.[24] In addition, patients' readiness to file claims and the somewhat different insurance practices could explain some of these differences.[22,23]

Research has shown that, numerically, women file more medical claims than do men in primary and hospital care.[2,23,25] The representation of women pertaining to patient injuries in dental care is also known, and some researchers have attributed this higher number of submitted claims to women's greater general interest in dental health and use of services [6,9]. Although we have no numerical information on dental injuries, the claim rates at the Finnish PIC among women substantially exceeded that of men (72% vs 28%). These figures are in line with research from different countries regarding claims in the field of endodontics, where female dominance varies between 60–77.5%.[6,11,15]

Conflicting findings regarding gender differences in compensation percentages reportedly depend on the field of medical care.[2,22,23] In our dental study, male patients received compensation slightly more often than female patients did. On the other hand, male dentists are reportedly more often involved with claims in the endodontic area than are female dentists.[6,11]

The age groups of the claimants in our study were similar to those in earlier reports.[6,11,12] Middle-aged patients file significantly more claims than do young or elderly patients in all medical areas, even though the elderly people clearly use the services more.[2,22–24] Working-age patients might be more active and aware of opportunities for reimbursement, whereas the elderly may perceive the claim process as too exhausting.

The study found that the number of dental claims in Finland increased from 2000 to 2003, but then levelled off at ~700 claims per year. Furthermore, after 2003 the number of eligible claims declined gradually each year and the number of decisions related to rejection for other reasons and insignificant injury increased. The reason for this could be related to awareness of the patient insurance system in Finland; the PIC has actively informed the health professionals of the availability of injury compensation and of the Centre's work over the years. On the whole, about one-third of all claims at the PIC during the past decade have received compensation.[8] The number of dental claims was higher at the beginning of the 2000s, but then dropped to a comparable level. About one-third of claims related to treatment procedures received compensation, which is a figure similar to that of a recent general study of all surgical claims in the Finnish PIC.[23]

Various insurance systems and sources of patient injuries exist, and different methods are needed to form an objective picture of the rate and causes of injuries.[17,26] Frequency of dental treatment injuries is built on self-reporting from dental personnel or patients and the occurrence of the events might be under-estimated.[27] An advantage in the Nordic no-fault

system is that seeking compensation may be easier and the healthcare personnel report injuries and errors more frequently, thus enabling proactive work to prevent adverse events.[17,27]

Our study was a representative nationwide longitudinal study, which used a comprehensive set of data over a 12-year period. Thanks to the large quantity of data, the study provides a broad picture of patient injuries in dental healthcare. Because of the relatively even distribution of dental care by health sector, we obtained interesting information on differences between the private and public sectors and between the dental disease groups. The PIC uses the International Classification of Diseases to categorize diseases, thus enabling comparison with studies from other countries.

In our study, we focused only on the three largest disease groups and, thus, obtained no information on smaller dental disease groups. We used the common background variables, but not the gender and education level of the healthcare professional or information on the area, where the patient received treatment. We aim to analyse this information later in future studies.

We found an increase in the number of dental patient insurance claims in Finland, with a concurrent declining trend in the percentage of reimbursed claims. The largest dental disease groups were diseases of the pulp and periapical tissues and dental caries. More claims received compensation in the private sector than in the public sector and female patients surpassed male patients as claimants.

Acknowledgements

We gratefully acknowledge the Finnish Patient Insurance Centre for providing the data in this study.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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